CIRCUIT DESCRIPTION

CD-1A186-01
ISSUE 3D
APPENDIX 2D
DWG ISSUE 10D
DISTN CODE 1T99

ELECTRONIC SWITCHING SYSTEMS
COMMON
INCOMING TRUNK
CIRCUIT
FROM LOCAL TEST DESK NO. 14
OR LOCAL TEST CABINET NO. 3
SLEEVE LEAD SUPERVISION

8

CHANGES

D. Description of Changes

D.1 Provided additional connecting information to permit the connection of this trunk circuit to the Loop Testing Circuit, SD-2P033-01, when required.

D.2 Corrected the Circuit Requirements Table to include the corrected terminal numbers for test points TP1 and TP2.

D.3 Made a minor CAD figure correction.

F. Changes in CD Section III

F.1 In 4:01 add:

(m) Loop Testing Circuit - SD-2P033-01.

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DEPT 5362-ZAK-GH

CIRCUIT DESCRIPTION

CD-1A186-01
ISSUE 3D
APPENDIX 1B
DWG ISSUE 9B
DISTN CODE 1T99

ELECTRONIC SWITCHING SYSTEMS

COMMON

INCOMING TRUNK
CIRCUIT
FROM LOCAL TEST DESK NO. 14
OR LOCAL TEST CABINET NO. 3
SLEEVE LEAD SUPERVISION

CHANGES

B. Changes in Apparatus

B.1 Added

R10 Resistor 18 FD, option S - App Fig. 1

D. Description of Changes

D.1 Revised FS1 to show the addition of option S. Wiring formerly not designated has been designated as option T and rated Mfr. Disc. These changes provide for the rewiring of ferrod sensor 01 in order to make this circuit longitudinally balanced across tip and ring.

D.2 Modified option index and Circuit Note 104 to show the added options.

F. Changes in CD Section III

F.1 Add 5.03 to read:

> 5.03 The manufacturing testing requirements for equipment using magnetic latching relays are specified in X-77483.

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DEPT 5317-ZAK-GH

CIRCUIT DESCRIPTION

JUN 6 1973

CD-1A186-01
ISSUE 3D
DWG ISSUE 8D

ELECTRONIC SWITCHING SYSTEMS

NO. 1
ARRANGED WITH 2-WIRE FEATURES

INCOMING TRUNK CIRCUIT FROM LOCAL TEST DESK NO. 14 OR LOCAL TEST CABINET NO. 3 SLEEVE LEAD SUPERVISION

TABLE OF CONTENTS PAGE

SECTION I - GENERAL DESCRIPTION 1
1. PURPOSE OF CIRCUIT. 1
2. GENERAL DESCRIPTION OF OPERATION. . 2
SECTION II - DETAILED DESCRIPTION . . . 2
1. CIRCUIT STATES. 2
STATE 0, IDLE 2
STATE 1, HOLD 2
STATE 2, TONE 2
STATE 3, TEST 2
STATE 4, BYPASS 2
STATE 5, NU 2
STATE 6, TONE WITH RING GROUND. . . 2
STATE 7, CONT CHK (CONTINUITY CHECK). 2
STATES 8, 9, 10, 11, 14, 15, 16, AND 17 NU (NOT USED). 2
STATE 12, DIAL TONE 3
STATE 13, X (TRANSITION). 3
2. TYPICAL SEQUENCE OF STATES. 3
SEIZURE 3
INPULSING COMPLETED 3
DIAL KEY RELEASED 3
BUSY OR OVERFLOW. 3

TABLE OF CONTENTS PAGE

CONNECTION TO CALLED LINE 3
LINE CIRCUIT TEST 3
"TOUCH-TONE" TEST 4
DISCONNECT. 4
3. PURPOSE OF CIRCUIT COMPONENTS . . . 4
SECTION III - REFERENCE DATA. 4
1. WORKING LIMITS. 4
2. FUNCTIONAL DESIGNATIONS 4
3. FUNCTIONS 5
4. CONNECTING CIRCUITS 5
5. MANUFACTURING TESTING REQUIREMENTS. 5
6. ALARM INFORMATION 5
7. TAKING EQUIPMENT OUT OF SERVICE . . 5
SECTION IV - REASONS FOR REISSUE. . . . 5

SECTION I - GENERAL DESCRIPTION

1. PURPOSE OF CIRCUIT

1.01 This circuit provides means by which the central processor, under direction of the stored program and acting through scanner and signal distributor circuits, can carry out the functions required in establishing a test path from a local test desk No. 14 or local test cabinet No. 3 to a customer line. The connection between the trunk circuit and the customer line is made via the trunk and line switching circuits if the line is idle or the no-test vertical if the line is busy. The circuit is arranged so that the proper combinations of functions (supervision, return dial tone, return 60- or 120-ipm interrupted low tone with or without synchronized ground on the ring conductor, lightning protection) can be established in the desired sequence as the call progresses from seizure to disconnect.

2. GENERAL DESCRIPTION OF OPERATION

2.01 When a seizure signal from a local test desk No. 14 or local test cabinet No. 3 is detected on the trunk scan point, the central processor sets up a connection to a suitable digit receiver via the trunk switching circuit. The trunk circuit is then switched through the hold state to the test state so that the receiver is connected directly to the incoming trunk conductors. Supervision of the trunk during inpulsing is maintained via the supervisory scan point associated with the receiver.

2.02 After inpulsing is completed, the trunk circuit is switched to the hold state, supervision is again the function of the trunk scan point, and the receiver is released.

2.03 The central processor sets up a connection to the called line and switches the trunk circuit to the test state.

2.04 When a disconnect is detected by the trunk scanner, the circuit is switched through the hold to the idle state.

SECTION II - DETAILED DESCRIPTION

1. CIRCUIT STATES

1.01 This circuit has four magnetic latching relays designated A, B, C, and D. These relays, controlled by the signal distributor circuit, permit the circuit to be switched into 16 different states. Each circuit state has a numerical designation which is the sum of the weighting numbers associated with each operated relay. Weighting numbers are assigned as follows: A = 1, B = 2, C = 4, D = 10.

1.02 The signal distributor circuit can operate or release only one relay at a time. Thus, the change from one state to another results in the change of one weighting number in state designation.

1.03 Information Note 302 displays the circuit states pictorially. Crossing a vertical or horizontal line in the diagram is equivalent to the operation or release of one relay.

1.04 The circuit is placed in a given state by the signal distributor circuit under control of the program. The scanner, again under program control, reports circuit conditions to central control so that the proper program decision can be made to select the next circuit state.

STATE 0, IDLE

1.05 Scan point 1 monitors the trunk toward test desk or test cabinet for seizure. Tip and ring toward the trunk switching circuit are open. The sleeve lead is open.

STATE 1, HOLD

1.06 Scan point 1 is connected to trunk to detect possible call abandon; tip and ring toward the trunk switching circuit are open. The sleeve lead is closed through to test desk. Normally, scan points 1, 2, and 4 are energized in this state.

STATE 2, TONE

1.07 Trunk conductors are extended through 200-ohm resistors to terminals 4 and 7 of transformer T. (The 200-ohm resistors are strapped out when Z option is provided.)

STATE 3, TEST

1.08 Trunk conductors are extended through 200-ohm resistors to terminals of the trunk switching circuit. (The 200-ohm resistors are strapped out when Z option is provided.) This state is used during pulsing and testing.

STATE 4, BYPASS

1.09 Trunk conductors are extended through 200-ohm resistors and reversed tip and ring are connected to terminals of the trunk switching circuit. (The 200-ohm resistors are strapped out when Z option is provided.) This state is used during pulsing.

STATE 5, NU

1.10 This state is not used in the normal operating sequence for this circuit.

STATE 6, TONE WITH RING GROUND

1.11 Same as state 2 with ground connection to terminal 8 of transformer T under control of a make-contact or relay F.

STATE 7, CONT CHK (CONTINUITY CHECK)

1.12 Resistive bridge across tip and ring toward the trunk switching circuit permits a dc check of network path.

STATES 8, 9, 10, 11, 14, 15, 16, and 17, NU (NOT USED)

1.13 These states are not used in normal operating sequences.

STATE 12, DIAL TONE

1.14 Dial tone is returned when the circuit is switched to this state. This is done when a line ferrod is checked and successfully energized by applying a bridge across tip and ring.

STATE 13, X (TRANSITION)

1.15 This state is used when switching from state 12 to state 3.

2. TYPICAL SEQUENCE OF STATES

2.01 Under control of the program, this circuit can be put through a variety of sequences. A typical state sequence is: 0-1-3-1-3-2-0. Note that this sequence assumes no abandons or special tests (exercise line circuits, TOUCH-TONE* tests, etc).

SEIZURE

2.02 When a seizure signal from the local test desk No. 14 or local test cabinet No. 3 is detected (scan point 1 energized), the central processor sets up a trunk switching circuit path to an idle digit receiver. This trunk circuit is then switched to the HOLD state (1), cutting the sleeve lead through to the test desk. Normally, low-resistance battery will be connected to the test desk end of the sleeve lead at this time and relays H and S will operate (scan points 2 and 4 will be energized). To complete the inpulsing connection, the trunk circuit is then switched to the TEST state (3) (scan point 1 is disconnected and, therefore, de-energized) so that the receiver is connected directly to the trunk conductors. Trunk supervision is maintained in the receiver during inpulsing.

INPULSING COMPLETED

2.03 After the digits are received, the trunk circuit is switched back to the HOLD state (1), and the receiver is released. Trunk supervision is returned to the trunk circuit (scan point 1 energized). If a disconnect should occur while the inpulsing connection is up (disconnect signal detected by the supervisory scan point in the receiver) or the keys are positioned incorrectly when supervision is returned to the trunk circuit (scan point 1 de-energized), the connection will be released.

DIAL KEY RELEASED

2.04 When digit transmission is complete, the dial key is released. A high-resistance negative battery is applied on the test desk end of the sleeve lead. Marginal relay H releases and scan point 2 is de-energized.

BUSY OR OVERFLOW

2.05 If the called and the no-test vertical lines are busy, a busy indication is returned. The trunk circuit is connected via the trunk switching circuit to a tone and recorded announcement circuit which provides continuous low tone. The trunk circuit is then switched to either the tone or the tone and ground state, depending on the condition of the dial key at the test desk. If the dial key is operated (scan points 2 and 4 energized) the circuit is switched to the tone state; if the dial key is released (scan point 4 energized) the circuit is switched to the tone and ground state. With the trunk circuit in the proper state, the continuous low tone is interrupted by relay F under control of the 60-ipm interrupter (provided via the interrupter applique circuit).

2.06 When the incoming trunk cannot be connected to the called line because there is no channel available through the trunk and line switching circuits, overflow tone must be returned. The procedure for this is the same as for busy tone except that 120-ipm interruptions are provided by the interrupter applique circuit.

CONNECTION TO CALLED LINE

2.07 Upon release of the dial key (see 2.04), the trunk circuit is connected to the called line via the trunk and line switching circuits if the line is idle or via the no-test vertical if the line is busy. The trunk circuit is then switched to the TEST state (3) so that dc access is provided to the line conductors with no bridging impedance.

LINE CIRCUIT TEST

2.08 To test the scan point associated with the line circuit of the called line, the 3W0 key is operated. This opens the sleeve lead at the test desk end and releases relay S (scan point 4 de-energized). The central processor then connects the line circuit across the called line. If the line scan point is energized by a bridge applied across tip and ring at the test desk, the trunk circuit is switched to the intermediate and then to the DIAL TONE state (12). Dial tone indicates that the line circuit and associated equipment and program are functioning properly. Supervision of trunk toward the test desk is maintained on scan point 3 during the time dial tone is being returned to the desk. To repeat the test, the tip-ring bridge is disconnected to de-energize scan point 3, the trunk circuit is switched back to the TEST state (3), and the line circuit is reconnected across the line. The test is terminated when the 3W0 key is released (scan point 4 energized).

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* Registered U.S. Patent Office.

"TOUCH-TONE" TEST

2.09 To test a subscriber TOUCH-TONE station set, the TT key is operated. A low-resistance positive battery is connected to the test desk end of the sleeve lead at this time operating relays H, S, and T (scan points 2, 4, and 5 are energized). The trunk circuit is switched to the HOLD state (1) and a trunk switching circuit connection is set up between this trunk circuit and the monitoring port of the TOUCH-TONE station test circuit. The trunk circuit is then switched through state 5 to the continuity check state to check dc continuity of the trunk switching circuit path and to the test state. When the test is finished, the TT key is released and the high-resistance negative battery is connected to the sleeve lead at the test desk. This releases relays H and T (scan points 2 and 5 are de-energized).

DISCONNECT

2.10 When the test cord is taken down, low-resistance battery is connected to the sleeve lead (scan points 2 and 4 energized) and the tip and ring are opened at the test desk (scan point 1 not energized when connected to tip and ring). Hence, whenever scan points 2 and 4 become energized after scan point 4 only was energized, the trunk circuit will be switched to the idle state. (Scan point 1 should be de-energized at this time.)

3. PURPOSE OF CIRCUIT COMPONENTS

3.01 Relay F under control of the interrupter applique circuit is used to return interrupted tone with or without interrupted ground when required. The appropriate tone is connected to this circuit via a path through the trunk switching circuit to the proper tone and recorded announcement circuit.

3.02 Relay H detects low-resistance battery applied on the sleeve lead at the test desk or cabinet.

3.03 Relay S detects high-resistance battery applied on the sleeve lead at the test desk or cabinet.

3.04 Relay T detects a high-resistance positive voltage applied on the sleeve lead at the test desk indicating a request for a TOUCH-TONE test has been made.

3.05 Transformer T provides means by which a 500-ohm ground synchronized with interrupted tones is connected to the trunk conductors.

3.06 Resistor R1 provides a resistive bridge across tip and ring on the trunk switching circuit side for making a continuity check of the network path when connection is made to various tone circuits.

3.07 Resistors R2, R3, R4, R7, and R9 are provided for current limiting and network surge current protection as required.

3.08 Resistors R5, R6, and R8 provide current limiting in local supervisory loops and limit the voltage rise due to inductive kick when relay contacts in local supervisory loops are opened.

3.09 Network N reduces noise caused by the ferrod sensor inductance when the loop is opened.

SECTION III - REFERENCE DATA

1. WORKING LIMITS

	Relay H	Scan Point 0
Max Ext Ckt Loop Resistance	1640 ohms	9200 ohms (Z option)
Min Ins Resistance	60,000 ohms	60,000 ohms

2. FUNCTIONAL DESIGNATIONS

2.01 Ferrod Sensors

Designation	Meaning
1,2,3,4,5	Number designations are assigned to ferrod sensors for programmer convenience.

2.02 Relays

Designation	Meaning
A,B,C,D	Magnetic latching relays are designated for programmer convenience.
F	Flashing - interrupted dc ground on trunk ring conductor.
H	Detects high current condition on sleeve lead.
S	Detects low current condition on sleeve lead.
T	Detects signal indicating request for connection

Designation	Meaning
	for testing a TOUCH-TONE station set.

3. FUNCTIONS

3.01 The functions which this circuit can perform are determined by program control which selects appropriate sequences of the states described in Section II.

4. CONNECTING CIRCUITS

4.01 When the circuit is listed on a keysheet, the connecting information thereon is to be followed.

(a) Trunk Switching Circuit - SD-1A107-01.

(b) Miscellaneous Trunk Frame Scanner Circuit - SD-1A117-01, or Master Scanner Circuit - SD-1A209-01.

(c) Miscellaneous Trunk Frame Signal Distributor Circuit - SD-1A128-01, or Signal Distributor Circuit - SD-1A216-01.

(d) Miscellaneous Circuit for All Frames - SD-1A129-01.

(e) Interrupter Applique Circuit - SD-1A130-01.

(f) LSV Trunk Access Switch Circuit - SD-1C398-01.

(g) Tone Circuit (Dial Tone Distribution) - SD-81652-01.

(h) Test Trunk at Test Desk - SD-95737-01.

(i) Test Trunk at Local Test Cabinet No. 3 - SD-96229-01.

(j) Test Trunk Ringing Circuit Modified for Use with Electronic Switching System No. 1 - SD-96474-01.

(k) LSV Test Trunk Applique Circuit - SD-97553-01.

(l) Remote Testing Circuit - Far End - SD-99311-01.

5. MANUFACTURING TESTING REQUIREMENTS

Intermediate Requirements

5.01 None.

End Requirements

5.02 This circuit should be tested to verify that it is wired in accordance with the schematic and wiring drawings, that the requirements specified on the circuit requirements table are met, that transmission test requirements are met, and that the circuit is capable of performing all functions stated in this circuit description.

6. ALARM INFORMATION

6.01 This circuit is fused via one fuse to the -48 volt supply on the bay fuse panel.

6.02 If this fuse blows, it will cause the FA relay in the frame miscellaneous circuit to operate an alarm.

7. TAKING EQUIPMENT OUT OF SERVICE

7.01 Instructions for taking this circuit out of service can be found in CD-1A132-01.

SECTION IV - REASONS FOR REISSUE

C. Changes in Circuit Requirements Other Than Those Caused by Changes in Apparatus

C.1 Test set preparation for magnetic latching relays was changed from BG to NGB to allow testing for negative (release and no-flux) currents.

C.2 Test Note 4 was replaced by a note stating that each magnetic latching relay must be placed in a no-flux (NF) condition before and after the operate test and after the release test. The second release test for each of these relays was eliminated.

C.3 Operate and release currents for magnetic latching relays were changed to allow for the effect of signal distributor check resistors that shunt the coils.

C.4 Certain block and insulate requirements were eliminated because it was found unnecessary to keep paths to the switching network open during testing.

C.5 Test set preparation for relays A, B, C, and D was changed from BG to NGB.

D. Description of Changes

D.1 Added Equipment Note 205.

D.2 Changed the title to conform to standards by adding "Arranged With 2-Wire Features."

D.3 Added (TT) after the tip and ring in FS 1 to correct the lead designations.

D.4 Added the LSV test trunk applique circuit and the LSV trunk access switch circuit to FS 1.

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